Tripura Electrical Engineering

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R/TES/E-I/DIP/16

Test Booklet Series

C

19.01.2017

TEST BOOKLET

ELECTRICAL ENGINEERING PAPER–I

(DIPLOMA)

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(Signature of the Candidate)

(Invigilator's Signature)

Time Allowed–3 hours (Three hours) **Maximum Marks–200**

INSTRUCTIONS

1. IMMEDIATELY AFTER THE COMMENCEMENT OF THE EXAMINATION, YOU SHOULD CHECK THAT THIS TEST BOOKLET DOES NOT HAVE ANY UNPRINTED OR TORN OR MISSING PAGES OR ITEMS ETC. IF SO, GET IT REPLACED BY TEST BOOKLET OF SAME SERIES.
2. **ENCODE CLEARLY THE TEST BOOKLET SERIES IN THE APPROPRIATE PLACE IN THE ANSWER SHEET BY BLACK BALL POINT PEN ONLY.**
3. This Test Booklet is divided into three sections, i.e **Section - A, Section - B & Section - C.**
   (A) **Section - A (MCQ pattern)** contains 40 items (questions). Each question, carrrying 2 (two) marks only, has four responses (answers). You will select the response which you want to mark on the **OMR Sheet**. In case you feel that there is more than one correct response, mark the response which you consider the most appropriate. In any case, choose ONLY ONE response for each item. There shall be no negative marking for wrong / multiple answer.
   (B) Questions under **Section-B (Conventional Method) & Section-C (Conventional Method)** are to be answered in separate **answer book**.
4. You have to mark all your responses of **Section-A by Black Ball Point Pen only** on the separate OMR Answer Sheet provided. See directions in the Answer Sheet.
5. Before you proceed to answer the responses to various items in the Test Booklet, you have fill in some particulars both in the Answer Sheet for Section-A and in the Answer Book for Section-B and Section-C
6. On the completion of the Examination, you should hand over the OMR Answer Sheet for Section – A & Answer Book for Section – B & C to the invigilator only. You are permitted to take the Test Booklet with you.
7. Sheets for rough work are appended on the Test Booklet at the end.

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All symbols have their usual meaning.

SECTION – A

Answer *all* questions. Each question carries 2 marks. 40×2=80

Choose the correct answer from the four alternatives provided with each question and mark on the OMR Sheet.

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Example : KWh is the unit of

● Energy (B) Power

(C) Electric charge (D) Electric current

1. The nature of power factor of industrial load is generally

   (A) unity

   (B) lagging

   (C) leading

   (D) none of the above

2. The loads on distribution system are generally

   (A) balanced

   (B) unbalanced

   (C) both (A) and (B)

   (D) none of the above

3. The distributions for residential areas are

   (A) single phase

   (B) three phase three wire

   (C) three phase four wire

   (D) none of the above

4. Most of the high voltage transmission lines in India are

   (A) underground

   (B) overhead

   (C) insulated cable

   (D) none of the above

5. The voltage of the single phase supply to residential consumers is

   (A) 110V

   (B) 210V

   (C) 230V

   (D) 400V

6. Which of the following D.C. distribution is the simplest and lowest in cost ?

   (A) Radial system

   (B) Ring system

   (C) Inter-connected system

   (D) None of the above

7. The square root of the ratio of line impedance and shunt admittance is called the

(A) surge impedance of the line

(B) conductance of the line

(C) regulation of the line

(D) none of the above

8. The phenomenon of rise of voltage at the receiving end of an EHV transmission line is called

(A) Seeback effect

(B) Ferranti effect

(C) Raman effect

(D) None of the above

9. 310 km line is considered as

(A) long line

(B) a medium line

(C) short line

(D) none of the above

10. Which of the following are the parameters of the transmission line ?

(A) Resistance

(B) Inductance

(C) Capacitance

(D) All of the above

11. The corona is considerably affected by which of the following ?

(A) Size of the conductor

(B) Shape of the conductor

(C) Surface condition of the conductor

(D) All of the above

12. By which of the following systems electric power may be transmitted ?

(A) Overhead

(B) Underground

(C) Both (A) and (B)

(D) None of the above

13. The set of conductors which connects the consumer's terminals to the distribution lines is called

(A) Distributors

(B) Service mains

(C) Feeders

(D) None of the above

14. Which of the following materials is not used for transmission and distribution of electric power ?

(A) Copper

(B) Aluminium

(C) Steel

(D) Tungsten

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23. Owing to skin effect

(A) current flows through the half cross-section of the conductor

(B) portion of the conductor near the surface carries more current and core of the conductor carries less current

(C) Portion of the conductor near the surface carries less current and core of the conductor carries more current.

(D) None of the above

24. In star-star connection of three phase transformer, if V_L is the line voltage and I_L is the line current, then phase voltage and phase current are given respectively by

(A) $\frac{V_L}{\sqrt{3}}, I_L$

(B) V_L, I_L

(C) $\sqrt{3}\ V_L, \frac{I_L}{\sqrt{3}}$

(D) $V_L, \frac{I_L}{\sqrt{3}}$

25. What is the advantage of the static capacitor ?

(A) Low losses

(B) Easy installation

(C) Lower maintenance

(D) All of the above

26. Power factor of an a. c. system can be improved by connecting

(A) Static capacitor

(B) Resistors

(C) Synchronous condensers

(D) Both (A) and (C)

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27. The primary reason for low power factor is due to the installation of

(A) Induction motors

(B) D.C. motors

(C) Synchronous motors

(D) None of these

28. A 440V / 110V transformer has 1000 turns on the primary windings. The number of turns on the secondary windings is

(A) 550

(B) 250

(C) 4000

(D) 25

29. Iron losses in a transformer are due to

(A) eddy current loss

(B) flux leakage

(C) both eddy and hysteresis loss

(D) the resistance of the primary and secondary windings

30. Which of the following is the major consideration to evolve a good design ?

(A) Cost

(B) Durability

(C) Compliance with performance, criteria as laid down in specifications

(D) All of the above

31. If an insulating material is operated beyond the maximum allowable temperature, its life is

(A) drastically increased

(B) drastically reduced

(C) unaffected

(D) None of these

32. The design of mechanical parts is particularly important in case of

(A) low speed machine

(B) high speed machine

(C) medium speed machine

(D) none of the above

33. In induction motors, the length of air gap is kept as small as mechanically possible in order to have

(A) low power factor

(B) high power factor

(C) high over load capacity

(D) none of the above

34. Materials exhibiting zero value of resistivity are known as

(A) conductors

(B) semiconductors

(C) insulators

(D) super conductors

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35. Fill up the blank with the correct option :

The efficiency of a machine should be as ..... as possible to reduce the operating cost.

(A) high

(B) low

(C) both (A) and (B)

(D) none of the above

36. For a consumer, what is the most economical power factor ?

(A) 0.25 - 0.5 lagging

(B) 0.25 - 0.5 leading

(C) 0.85 - 0.95 lagging

(D) 0.85 - 0.95 leading

37. Which among the following happens in a system of low power factor ?

(A) Large kVA rating of the equipment

(B) Greater conductor size

(C) Reduced handling capacity of the system

(D) All of the above

[Turn over

8. Pin type insulators are used for transmission and distribution of electric power up to

(A) 33 kV

(B) 66 kV

(C) 132 kV

(D) None of these

39. Ratings of the transformer is done in

(A) kVA

(B) kVAR

(C) kW

(D) None of these

40. Expression for string efficiency in case of a overhead line can be written as

(A) $\frac{\text{Voltage across the string}}{n \times \text{voltage across disc nearest to conductor}}$

(B) $\frac{\text{Voltage across disc nearest to conhductor}}{n \times \text{voltage across the string}}$

(C) $\frac{1}{n}$

(D) None of these

when n = number of discs in the string.

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SECTION – B

Answer *all* the questions. 15×6=90

The figure in the margin indicate full marks for the questions.

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1. Suggest two methods for improving the string efficiency.

2. What is hydrograph ? On what factor does the output of hydroplant depend ? 3+3=6

3. What do you mean by fission and fussion ?

4. Name the main parts of a modern thermal plant.

5. What do you understand by the term 'Infinite bus' ? Write down the condition for parallel operation of transformer. 3+3=6

6. Explain hysteresis and eddy current losses in transformer core.

7. Explain the term 'sag' in overhead transmission line.

8. Write down the factors affecting corona.

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9. What is meant by service line ? What is the aim of performing IR test between the wiring and earth ? 2+4=6

10. Name and explain two methods for controlling the speed of D.C. series motor.

11. Draw and explain the torque speed characteristics of induction motor.

12. How can we improve the power factor using synchronous condenser ?

13. Classify the electrical transmission line based on their length.

14. Write down the merits and demerits of nuclear power plant.

15. Why do we neglect the effect of shunt capacitance in case of a short transmission line ?

[Turn over

SECTION – C

Answer *all* the questions. 5×6=30

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1. A 132 kV transmission line has the following data :

   Wt of conductor 680 kg/km, length of span=260m, ultimate strength = 3100 kg, safety factor = 2.

   Calculate the height above ground at which the conductor should be supported. Ground clearance required is 10m.

2. The induced emf of two single phase alternator running in parallel are $3000 \angle 20^\circ$ and $2900 \angle 0^\circ$ volts. The synchronous impedances are $2 + j\,20$ and $2.5 + j\,30\Omega$ The load impedance is $10 + j\,4\Omega$.

   Determine the circulating curent.

3. Assume the transformer of Fig.1 is ideal transformer. The secondary is connected to a load of 5Ω. What is the secondary terminal voltage ? Also calculate secondary power output.

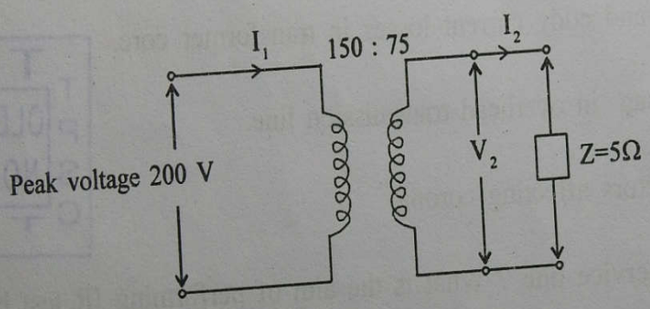

Fig – 1

4. A 6 pole, 50 Hz, 3 phase induction motor running on full load develops a useful torque of 160 Nm when the rotor emf makes 120 complete cycles per minute. Calculate the shaft power output.

5. A bank of capacitors each 40×10^{-6} F connected in delta is used to improve the power factor of a 3 phase, 400V, 40A load at 0.8 lagging power factor. Find the overall power factor.

(Space for rough work)

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